

1 What is claimed:

1. **(Currently amended)** A system for synthesizing a nano-scaled powder material, comprising:

- (A) a chamber for receiving nano-scaled clusters generated from a material selected from the group consisting of a metal, a metal compound, and a ceramic;
- (B) a twin-wire electrode device in supplying relation to said chamber for supplying nano-scaled clusters therein, said electrode device comprising
- (i) two wires made up of said material, with each wire having a leading tip which is continuously or intermittently fed into said chamber in such a fashion that the two leading tips are maintained at a desired separation; and
- (ii) means for providing electric currents and a working gas flow for creating an ~~ionized~~ a first plasma arc between the two leading tips for ~~melting and/or~~ vaporizing said material to generate said nano-scaled clusters;
- (C) means for injecting a quench gas and/or a reaction gas into a quenching/reaction zone inside said chamber at a point ~~inside said arc or~~ downstream from said arc to facilitate the formation of nano-scaled powder particles; and
- (D) means to collect the nano-scaled powder material.

2. **(Currently amended)** The system as defined in claim 1, further including a second plasma arc zone below said ~~ionized~~ first plasma arc to vaporize any un-vaporized material dripped therefrom.

3. **(Currently amended)** The system as defined in claim 1, wherein said arc defines a shape having a top portion and a bottom portion and said system further includes ~~including~~ a reservoir disposed at the bottom portion of said arc or a distance below said arc in such a fashion that said reservoir receives any un-vaporized material from the wires and exposes said un-vaporized material to the heat energy of said arc to further vaporize at least a portion of said un-vaporized material.

1 4. **(Currently amended)** A system for synthesizing a nano-scaled powder material mixture,
comprising:

- (A) a chamber for receiving nano-scaled clusters generated from two materials of different
compositions with each material selected from the group consisting of a metal, a metal
compound, and a ceramic;
- 6 (B) a twin-wire electrode device in supplying relation to said chamber for providing nano-
scaled clusters therein, said electrode device comprising
- (i) two wires respectively made up of said two different materials, each wire having a
leading tip and each wire being continuously or intermittently fed into said
chamber in such a fashion that the two leading tips are maintained at a desired
11 separation; and
- (ii) means for providing electric currents and a working gas flow for creating an
ionized arc between the two leading tips for ~~melting and/or~~ vaporizing said
materials to generate said nano-scaled clusters;
- (C) means for injecting a quench gas and/or a reaction gas into a quenching/reaction zone
16 inside said chamber at a point ~~inside said arc or~~ downstream from said arc to produce a
nano-scaled powder particle mixture; and
- (D) means to collect the nano-scaled powder material mixture.

5. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including wire feed
and control means to regulate the feed rates of said two wires.

21 6. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said means for
providing electric currents comprises an electric power supply selected from the group consisting
of a high-voltage source, a high-current source, a pulsed power source, and combinations thereof.

7. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including means
for controlling the rate of flow of the quench gas and/or the reaction gas, thereby enabling change
26 of particle size of the nano-scaled powder material.

1 8. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said reaction gas is selected from the group consisting of nitrogen, phosphorus, arsenic, oxygen, sulfur, selenium, tellurium, fluorine, chlorine, bromine, iodine, a carbon-containing gas, and mixtures thereof.

9. **(Cancelled).**

10. **(Cancelled).**

6 11. **(Previously presented)** The system as defined claim 1, 2, 3, or 4 wherein said means for injecting comprises a concentric gas injection device adjustably positioned along the location of said ionized arc.

11 12. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said quench gas is selected from the group consisting of helium, argon, air, water vapor, carbon monoxide, carbon dioxide, hydrogen and combinations thereof.

13. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including means for providing dissociable inert gas mixable with said working gas, the dissociable inert gas increasing the temperature gradient in said ionized arc.

16 14. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 further including means separate from said means for injecting a quench/reaction gas, said separate means for injecting a cooling gas into said nano clusters, thereby minimizing agglomeration of the nano powder material or mixture.

15. **(Previously presented)** The system as defined in claim 1, 2, 3, or 4 wherein said working gas flow direction is approximately vertical.